Remarks

The Office Action dated October 23, 2003 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-35 are pending in this application. Claims 1-11 and 25-33 stand rejected. Claims 12-24 and 34-35 are withdrawn from consideration.

The rejection of Claims 1-11 and 25-33 under 35 U.S.C. § 103(a) as being unpatentable over Kapich (US 4,413,348) in view of either one of Interrante et al. (US 3,821,358) or Wentorf (US 3,842,164) is respectfully traversed.

Kapich describes a system for increasing the temperature of a fluid heated by a high temperature gas cooled nuclear reactor. The system includes a high temperature gas cooled nuclear reactor and two secondary closed loops containing a working fluid. The first secondary closed loop 42 is a steam loop that uses water as the working fluid. The second secondary closed loop 24 uses a gas such as nitrogen or helium as the working fluid. The first secondary loop 42 includes a heat exchanger 56 which heats feed water from source 72 to 480°F (249°C). Feed hydrocarbon gas from source 62 is added to the feed water. The mixture then passes through another heat exchanger 68 which heats the feed water and gas to 1025°F (558°C). The heated feed water and is then directed into a reformer 36 where hydrogen is produced from the hydrocarbon gas. The temperature of the water/gas mixture is raised to 1460°F (794°C) in the reformer by the working fluid of the second secondary loop 24. The second secondary loop 24 includes a heat pump that raises the temperature of the working fluid to 1460°F (794°C).

Claim 1 of the present application recites "a system for generating hydrogen comprising: . . . a liquid metal nuclear reactor having a non-radioactive secondary heat loop comprising a

recirculated heat transfer medium; . . . a high temperature water cracking system, said feed water coupled to said water cracking system by a feed water input line, said secondary heat loop and said recirculated heat transfer medium being separate from said high temperature water cracking system; . . . a topping heater, said topping heater capable of raising the temperature of said feed water, . . . said feed water disassociated into hydrogen and oxygen in said high temperature water cracking system, said high temperature water cracking system being separate from all secondary heat loops of said liquid metal nuclear reactor."

Claim 25 of the present application recites "a system for generating hydrogen comprising . . . a liquid metal nuclear reactor having a non-radioactive secondary heat loop comprising a recirculated heat transfer medium; a steam generator . . . said steam generator capable of raising the temperature of said feed water to between about 450°C to about 550°C; a high temperature water cracking system, . . . said secondary heat loop and said recirculated heat transfer medium being separate from said high temperature water cracking system; and a topping heater, said topping heater capable of raising the temperature of said feed water so that said feed water in said high temperature water cracking system is at least about 850°C, . . . said feed water disassociated into hydrogen and oxygen in said high temperature water cracking system, said high temperature water cracking system being separate from all secondary heat loops of said liquid metal nuclear reactor."

Applicants respectfully submit that Kapich does not describe nor suggest a system for generating hydrogen as recited in Claim 1 or a system as recited in Claim 25. Particularly, Kapich describes a first secondary loop that includes a heat exchanger 56 through which feed water is passed and is heated to 480°F (249°C), and a second secondary loop that includes a heat

pump that increases the temperature of the working fluid to 1460°F (794°C) before the working fluid is passed through the reformer 36. The feed water is combined with the feed gas and the combination is passed through a heat exchanger 68 which heats the mixture to 1025°F (558°C). In contrast, the system recited in Claim 1 and the system recited in Claim 25 include a secondary heat loop and a recirculated heat transfer medium that is separate from the high temperature water cracking system. Specifically, there is no direct interface between the secondary heat loop and the working fluid and the high temperature water cracking system. Further, Claims 1 and 25 recite that the high temperature water cracking system is separate from all secondary heat loops of the nuclear reactor. Kapich describes at Col. 4, lines 6-9 that "the mixture of feed gas and process steam passes through reformer 36 where it is heated to approximately 1400°F by the working gas in the secondary loop 24". This means that the secondary loop 24 has a direct interface with the reformer 36 and is not separate. Also, the heat exchanger 68 of Kapich does not heat the feed water to 850°C as recited in Claim 25 of the present application. Kapich describes that the temperature of the feed gas and process steam in the reformer is 1400°F (760°C) which is significantly lower than the 850°C recited in Claim 25 of the present application.

Further, reformer 36 is not a high temperature water cracking system as recited in Claims 1 and 25 of the present application. Particularly, reformer 36 extracts hydrogen from the hydrocarbon feed gas, typically methane, and does not disassociate water into hydrogen and water as recited in Claim 1 and 25 of the present application. Accordingly, Applicants submit that Claims 1 and 25 are patentable over Kapich.

Interrante et al. and Wentdorf are cited for teaching the use of a liquid metal reactor as a heat source for thermochemical production of hydrogen and oxygen. Interrante et al. and Wentdorf are not cited for, and do not teach or suggest a high temperature water cracking system with the feed water coupled to the water cracking system by a feed water input line coupled in flow communication with the steam generator, the topping heater, and the high temperature water cracking system, where the reactor secondary heat loop and the recirculated heat transfer medium are separate from the high temperature water cracking system, and where the high temperature water cracking system is separate from all secondary heat loops of the liquid metal nuclear reactor.

Kapich, Interrante et al. and Wentdorf, alone or in combination, do not describe nor suggest a system for generating hydrogen as recited in Claim 1 or a system as recited in Claim 25. Particularly, and as explained above, Kapich, Interrante et al. and Wentdorf, alone or in combination, do not describe nor suggest a system for generating hydrogen that includes a liquid metal nuclear reactor having a non-radioactive secondary heat loop having a recirculated heat transfer medium, and a high temperature water cracking system, with the secondary heat loop and the recirculated heat transfer medium being separate from the high temperature water cracking system, and with the high temperature water cracking system is separate from all secondary heat loops of the liquid metal nuclear reactor. Accordingly Applicants submit that Claims 1 and 25 are patentable over Kapich, Interrante et al. and Wentdorf, alone or in combination.

Claims 2-11 depend from independent Claim 1 and Claims 26-33 depend from independent Claim 25. When the recitations of dependent Claims 2-11 and 26-33 are considered

in combination with the recitations of Claims 1 and 25 respectively, Applicants respectfully submit that Claims 2-11 and 26-33 likewise patentable over Kapich, Interrante et al. and Wentdorf, alone or in combination.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1-11 and 25-33 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,

Michael Tersillo
Registration No. 42,180
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070